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(54) Flame responsive gas burner ignition

(57) A gas burner ignition and safety arrangement, especially for use in gas cooking hobs, comprises a gas tap 2 and an integral gas cut-off valve 4 for controlling gas flow to a gas burner 3. The gas tap 2 is axially depressed to manually override the gas cut-off valve 4 when the gas tap is turned ON and a thermocouple 10 is provided which is responsive to a flame at the gas burner 3 to generate a voltage which holds the gas cut-off valve 4 open. So that the gas tap 2 need not be held depressed whilst the thermocouple 10 is heating up, as part of the usual ignition generator 7 a monostable pulse generator responsive to an electrical switch 5 operated by the gas tap 2 generates a pulse output 12 having a predetermined time period which is applied to the gas cut-off valve 4 to hold it open, thereby allowing the gas tap 2 to be released.

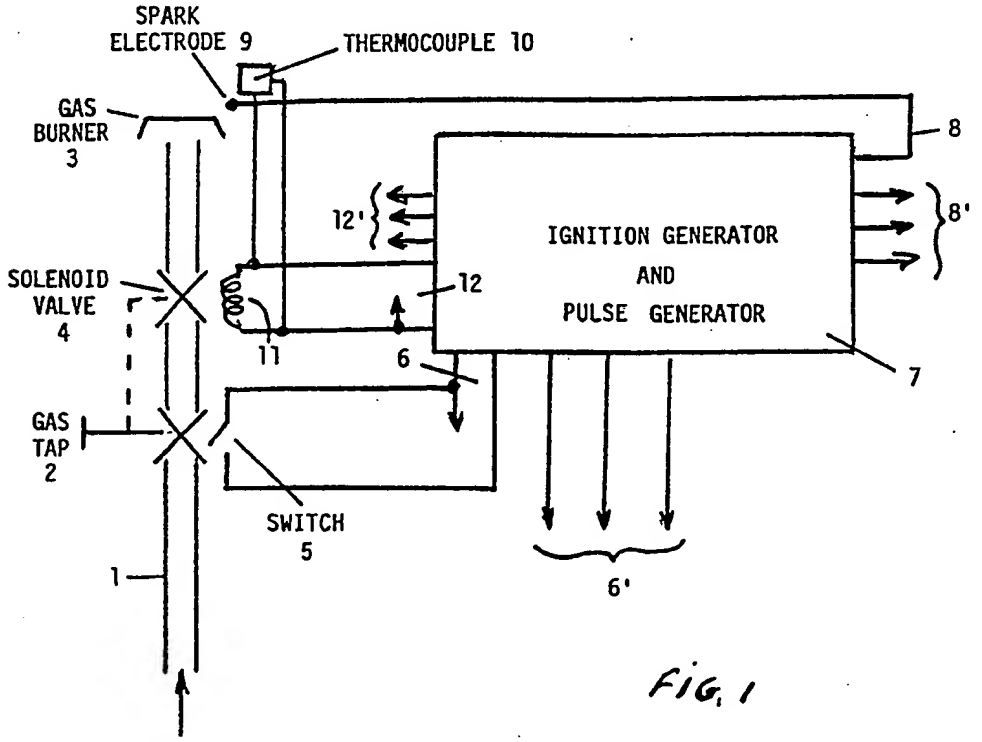

FIG. 1

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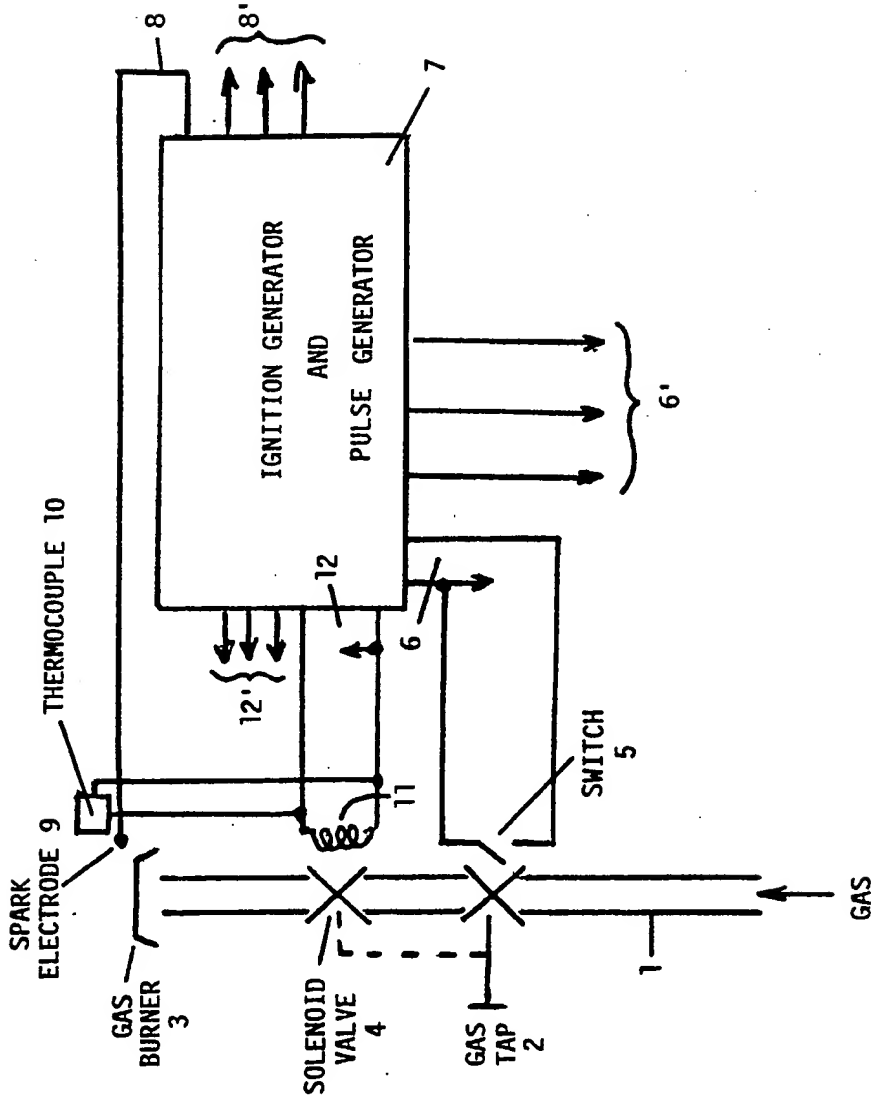
8
8'
7
IGNITION GENERATOR
AND
PULSE GENERATOR
6'
12
12'
6
THERMOCOUPLE 10
SPARK
ELECTRODE 9
11
SWITCH
5
GAS
BURNER
3
SOLENOID
VALVE
4
GAS
TAP
2
1
GAS

Safety Arrangements

This invention relates to safety arrangements and more specifically to safety arrangements for gas burners e.g. of a gas cooking hob.

It is becoming a requirement of gas cooking hobs that the gas burners thereof be provided with a gas cut-off safety arrangement, which cuts off the supply of gas to the gas burner should the gas flame become extinguished for any reason e.g. by draughts, cooking spillage, etc. One way of providing such a safety arrangement has been to provide the gas tap to the gas burner with a flame failure device comprising a solenoid operated gas cut-off valve which operates in conjunction with a thermocouple which is disposed in the flame of the gas burner. The solenoid cut-off valve is normally closed and prevents gas from being supplied to the gas burner. The gas tap is provided with a manual override arrangement for the solenoid cut-off valve which requires the gas tap to be pushed in axially, this causing the cut-off valve to be opened and gas to be supplied to the gas burner. The gas tap is also usually provided with an electrical switch which is operated when the gas tap is pushed in and rotated and which activates a spark ignition generator which causes a spark to be generated in the vicinity of the gas burner to cause the gas supplied to it to be ignited. The thermocouple device of the flame failure device which is disposed in the flame of the gas burner is heated by the flame and causes it to generate a voltage which is applied to the solenoid of the solenoid cut-off valve which is sufficient to hold the cut-off valve in the open position, and allows the axial pressure on the gas tap to be released. Should the flame of the gas burner become extinguished for any

reason the thermocouple will cool down and the voltage generated by it will fall until a point is reached where it is insufficient to hold the cut-off valve open, which therefore closes to cut off the gas supply to the gas burner.

The major disadvantage of this arrangement is that the gas tap has to be manually pushed inwards for a period of approximately fifteen to twenty seconds in order to allow the thermocouple to heat up sufficiently to generate the voltage necessary to hold the cut-off valve open.

It is an object of the present invention to provide a safety arrangement for a gas burner which obviates the need for the gas tap to be held in the pushed inwards position.

According to one aspect of the present invention there is provided a safety arrangement for a gas burner comprising a gas tap for controlling gas flow to said gas burner, gas cut-off means for cutting off gas flow to said gas burner, means for causing said gas cut-off means to be initially opened when gas is to be supplied to said gas burner, electrical control means operable when said gas cut-off means is initially opened for maintaining it open for a predetermined period, and means responsive to the presence of a flame at said gas burner for maintaining said gas cut-off means open.

In carrying out the invention it may be arranged that said gas cut-off means takes the form of a solenoid operated valve, which is conveniently caused to be opened by said gas tap, when said gas tap is axially depressed.

Conveniently, electrical switch means will be provided which is operated when said gas tap is turned on and advantageously said electrical control means comprises pulse generator means, e.g. a monostable

pulse generator which is responsive to said electrical switch means for generating a pulse of said predetermined period for application to said solenoid operated valve for maintaining it open for said predetermined period.

In a preferred arrangement thermocouple means will be provided which is arranged to be disposed in the flame of said gas burner, and which affords an output to said solenoid operated valve for maintaining it open.

It may be arranged that a safety arrangement in accordance with the present invention may comprise spark electrode means disposed in the vicinity of said gas burner, and ignition generator means responsive to the operation of said electrical switch means for causing a spark to be generated at said spark electrode means.

Advantageously, said pulse generator means and said ignition generator means will be formed as an integral unit.

According to other aspects of the present invention there is provided a gas burner including a safety arrangement according to said first aspect, and also a gas cooker including one or more such gas burners.

An exemplary embodiment of the invention will now be described with reference to the accompanying single figure drawing which is a block schematic diagram of a safety arrangement in accordance with the present invention.

The safety arrangement shown in the drawing comprises a gas supply pipe 1 having a gas tap 2 for controlling the flow of gas to a gas burner 3. The gas tap 2 has formed integrally with it a solenoid operated gas cut-off valve 4 which is effectively connected

between the gas tap 2 and the gas burner 3. The gas tap 2, which is of well known form, is of the type which is depressed axially in order to overcome a niting stop and also to effect manual override of the solenoid operated gas cut-off valve 4 causing it to be opened, and is then rotated in order to variably control the flow of gas to the gas burner 3. In order to keep the gas cut-off valve 4 open the gas tap 2 has to be kept in its fully depressed state.

The gas tap 2 is also provided with an electrical switch 5 coupled to it which is caused to be closed when the gas tap 2 is axially depressed. The electrical switch 5, is connected to a switch input 6 of a combined ignition generator and pulse generator 7 which affords a spark output 8 which is fed to a spark electrode 9 disposed in the vicinity of the gas burner 3. The ignition generator is preferably of the re-ignition type which generates sparks continuously until a flame is detected.

Thus, when the gas tap 1 is fully depressed and turned ON, the gas cut-off valve 4 is caused to be opened to allow gas to flow to the gas burner 3, and the electrical switch 5 is operated to cause a spark to be generated at the spark electrode 9 to cause the gas burner 3 to light. Disposed in the flame of the gas burner 3 is a thermocouple 10, of well-known form, which, when it is heated generates a voltage which is applied to the solenoid coil 11 of the gas cut-off valve 4, the generated voltage being sufficient to hold the gas cut-off valve 4 open.

The safety arrangement which has thus far been described is of conventional well-known form and suffers from the disadvantage that the thermocouple 10 takes in the order of fifteen to twenty seconds to warm up sufficiently to generate a voltage to hold open the

gas cut-off valve 4, and therefore the gas tap 2 has to be fully depressed for at least this period of time in order to manually override the gas cut-off valve 4.

In order to overcome this disadvantage, the safety arrangement shown in the drawing includes a pulse generator, typically in the form of a monostable pulse generator, which is integrated with the ignition generator to afford a combined unit 7, the pulse generator being responsive to the operation of the electrical switch 5, via the switch input 6, for generating a pulse output 12 having a predetermined time period which is applied to the solenoid coil 11 of the gas cut-off valve 4. The voltage of the pulse output 12 is arranged to be sufficient to hold the gas cut-off valve 4 in its open position, and the time period of the pulse output 12 is arranged to be longer than the usual time for the thermocouple 10 to heat up e.g. 20 to 25 seconds, so that the need to manually depress the gas cut-off valve 4 for the time period that the thermocouple 10 is heating up is obviated.

If, after the predetermined time period of the pulse output 12 the thermocouple 10 has not been heated sufficient to generate the voltage necessary to hold open the gas cut-off valve 4, this probably indicating that the gas burner 3 has not lit, then the gas cut-off valve will close and will cut off the gas supply to the gas burner 3.

It will be appreciated that an important use of the safety arrangement which has been described is in the gas burners of a gas cooking hob. Typically, a gas cooking hob includes four gas burners each of which is provided with its own gas tap 2 and integral gas cut-off valve 4, and associated electrical switch 5.

The combined ignition generator and pulse generator 7 in the drawing is provided with additional

switch inputs 6' for connection to the electrical switches of the additional gas burners, additional spark outputs 8' for connection to the spark electrodes 9 of the additional gas burners, and also additional pulse outputs 12' for connection to the solenoid coils 11 of the gas cut-off valves 4 associated with the additional gas burners. The ignition generator and pulse generator 7 accordingly includes four (mono-stable) pulse generators for affording the pulse outputs 12 and 12'.

It should be appreciated that the safety arrangement which has been described has been given by way of example only and may be modified to suit any particular application. Although especially suitable for use with gas burners of gas cooking hobs, it should be appreciated that the safety arrangement which has been described could be used with other types of gas burner, e.g. in gas boilers, gas fires, etc.

CLAIMS

1. A safety arrangement for a gas burner comprising a gas tap for controlling gas flow to said gas burner, gas cut-off means for cutting off gas flow to said gas burner, means for causing said gas cut-off means to be initially opened when gas is to be supplied to said gas burner, electrical control means operable when said gas cut-off means is initially opened for maintaining it open for a predetermined period, and means responsive to the presence of a flame at said gas burner for maintaining said gas cut-off means open.

2. An arrangement as claimed in claim 1, in which said gas cut-off means takes the form of a solenoid operated valve.

3. An arrangement as claimed in claim 2, in which said solenoid operated valve is caused to be opened by said gas tap.

4. An arrangement as claimed in claim 3, in which said solenoid operated valve is opened when said gas tap is axially depressed.

5. An arrangement as claimed in claim 3 or claim 4, comprising electrical switch means which is operated when said gas tap is turned on.

6. An arrangement as claimed in claim 5, in which the electrical control means comprises pulse generator means which is responsive to said electrical switch means for generating a pulse of said predetermined period for application to said solenoid operated valve for maintaining it open for said predetermined period.

7. An arrangement as claimed in claim 6, in which said pulse generator means takes the form of a monostable pulse generator.

8. An arrangement as claimed in claim 6 or claim 7, comprising thermocouple means which is arranged to

be disposed in the flame of said gas burner, and affords an output to said solenoid operated valve for maintaining it open.

9. An arrangement as claimed in any of claims 6 to 8, comprising spark electrode means disposed in the vicinity of said gas burner, and ignition generator means responsive to the operation of said electrical switch means for causing a spark to be generated at said spark electrode means.

10. An arrangement as claimed in claim 9, in which said pulse generator means and said ignition generator means are formed as an integral unit.

11. An arrangement as claimed in claim 9 or claim 10, in which said ignition generator means takes the form of a re-ignition type spark generator.

12. A safety arrangement substantially as hereinbefore described with reference to the accompanying drawing.

13. A gas burner including a safety arrangement as claimed in any preceding claim.

14. A gas cooker including one or more gas burners as claimed in claim 13.

Patents Act 1977
Examiner's report to the Comptroller under Section 17 (The Search Report)

Application number 9023566.4

Relevant Technical fields

(i) UK Cl (Edition K) F4T (THB)

(ii) Int Cl (Edition 5) F23N, F23Q, F23D

Search Examiner

M J DAVEY

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

12 December 1990

Documents considered relevant following a search in respect of claims 1 to 14

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2013867A (PINSCH BAMAG) See in particular page 3 lines 1 to 24	1,2
Y	GB 1584766 (JOHNSON CONTROLS) See claim 1 in particular	1,2
X	GB 1137986 (POTTERTON)	1

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

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P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

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